Description

System and Method for Performing Service Operations

Technical Field

The present invention relates generally to service operations for machine and more particularly, to a system and method for sharing information regarding a machine between service tools.

Background Art

Computer software tools are used in performing service type operations for certain types of machines. For example, field technicians utilize a number of tools to diagnose, retrieve information stored in external databases, retrieve information from sources on the machines, such as electronic control modules, and the like.

Typically, such tools are computer based and reside in a portable computer such as a notebook computer. Such tools were designed to communicate, i.e., share information using one of several different interprocess communication protocols, e.g., the Transmission Control Protocol/Internet Protocol (TCP/IP), Dynamic Data Exchange (DDE), or the Component Object Model (COM).

With the advent of these tools, it has been become desirable to link the various software tools to share and exchange information or control data. However, since the various software tools did not share a common communication protocol, the software tools would normally have to be revised to include

integration modules which facilitated communication between one tool and one other tool.

Revising the tools to use a single protocol is time consuming and inefficient. Additionally, different protocols have different benefits which may be suitable for one tool and not for another.

The present invention is directed to overcoming one or more of the problems as set forth above.

Disclosure of the Invention

In one aspect of the present invention a system for performing service operations on a machine is provided. The system includes first and second computer based service tools and a computer based workbench. The computer based workbench includes first and second application proxies and a binary network object with first and second interfaces. The application proxies are connected to one another through a stable integration protocol and binary network object. The first application proxy is coupled to the first computer based service tool and the second application proxy is coupled to the second computer based service tool. The first computer based service tool has access to service information in the second computer based service tool through the computer based workbench.

In another aspect of the present invention a method for sharing service information between first and second service tools is provided. The method includes the steps providing a binary network object having first and second interfaces. The method also includes the steps of providing a first application

proxy coupled to the first interface and providing a second application proxy coupled to the second interface. The method further includes the step of sharing service information between the first and second computer based service tools through the first and second application proxies and the first and second interfaces.

Brief Description of the Drawings

Fig. 1 is a block diagram of a system for performing service operations on a machine, according to an embodiment of the present invention;

Fig. 2 is a flow diagram of a method for sharing service information between first and second service tools, according to an embodiment of the present invention;

Fig. 3 is a block diagram of a system for performing for performing service operations on a machine, according to another embodiment of the present invention; and,

Fig. 4 is a diagrammatic illustration of a graphical user interface, according to an embodiment of the present invention.

Best Mode for Carrying Out the Invention

With reference to the drawings and in operation, the present invention provides a system 100 and method for performing service operations on a machine 102. With specific reference to Fig. 1, the system includes first and second computer based service tools 104A,104B.

The system 100 also includes a computer based

workbench 106 which includes a binary network object 108. The binary network object 108 includes first and second interfaces 110A,110B. As described below, the binary network object 108 allows the first and second service tools 104A,104B to communicate, i.e., share information.

Preferably, the workbench 106 is a computer based tool implemented on a portable computer (not shown) with at least one of the first and second computer based service tools 104A,104B.

The workbench 106 provides a common graphical user interface (see below) for a user to access and operate the first and second computer based service tools 104A,104B.

The workbench 106 includes a first application proxy 112A and a second application proxy 112B coupled to the first and second service tools 104A,104B respectively.

The first and second application proxies 112A,112B each includes a constant portion 114A,114B and an application programming interface 116A,116B.

In the preferred embodiment, the binary network object 108 is implemented using the Component Object Model or COM. The binary network object 108 includes first and second interfaces 110A,110B coupled to the constant portions 114A,114B of the first and second application proxies 112A,112B, respectively.

As described below, this arrangement allows one of the first and second computer based service tools 104A,104B to have access to information on the other service tool 104A,104B.

With reference to Fig. 2, a method 200 for

sharing service information between the first and second service tools 104A,104B is shown. In a first control block 202, the binary network object 108 having first and second interfaces 110A,110B is provided. In a second control block 204, the first application proxy coupled to the first interface is provided. In a third control block 206, the second application proxy coupled to the second interface is provided. In a fourth control block 206, service information is shared between the first and second service tools 104A,104B through the first and second application proxies 112A,112B and the first and second interfaces 110A,110B.

With reference to Fig. 3, a system 300 for providing service operations to a work machine 302 is illustrated. The work machine can be any sort of machine such as an earthmoving machine, construction machine, transportation machine, engine, computer, air conditioner, etc. … . This list is exemplary only and not intended to be exclusive. In the system 300 a plurality of service tools 304A-304F are provided.

A Diagnostic Advisor 304A provides a computer based method and system and a computer program for providing case based diagnostics for the work machine 302.

A Service Information System (SIS) 304B includes service information related to the work machine 302. Preferably, the SIS 304B includes system functional tests, diagnostic code procedures, and other service information.

An Electronic Technician (ET) 304C is a computer software program for communication with electronic

controls the work machine 302 and for retrieving information therefrom. The ET 304C is coupled to an onboard datalink and is able to read diagnostic and event codes, status parameters in real-time and to perform electronic control module calibrations and configurations.

A Data View Module 304D for viewing data related to the work machine 302. For example, the Data View Module 304D is able to read (remotely) and display sensor data.

An Engine Performance Estimator (EPE) 304E and a Reports and Feedback Module 304F are also provided. The EPE 304E is a service tool designed specifically for truck engines to help a field technician resolve customer performance complaints, e.g., low power and/or poor fuel economy.

The prior enumeration of service tools is exemplary only and not intended to be exclusive.

The service tools 304A-304F are able to share information through a workbench 306. For example, the Diagnostic Advisor 304A may contain links to information contained in the SIS 304B to support its recommendations. The Diagnostic Advisor 304A, SIS 304B, Electronic Technician 304C, Data View Module 304D, EPE and Reports and Feedback Module 304F are discussed further in U.S. Patent Application Serial No. (internal docket no. 00-104 filed on December 19, 2000) and U.S. Patent Application Serial No. (internal docket no. 00-400 filed on December 19, 2000), which are hereby incorporated by reference.

The workbench 306 includes a binary network object 308 having first through sixth interfaces 310A-

object 308 having first through sixth interfaces 310A-310F. First through sixth application proxies 312A-312F couple the service tools 304A-304F to the workbench 306 and each other 304A-304F via the respective interface 310A-310F.

In the preferred embodiment, the system 100 and method 200 of the present invention is embodied in a computer program product, i.e., software. The computer program product comprises a computer useable storage medium having computer readable program code means embodied in the medium.

With reference to Fig. 4, the present invention provides a graphical user interface 400 for use by the user 110 to interface with the system 100. The graphical user interface 400 includes Menu Bar 402, a Tool Bar 404, an application container 406, and a Launch Pad 408. The Launch Pad 408 includes a plurality of buttons for providing access to the service tools 104A-104B, 304A-304F. For example, the Launch Pad 408 includes a Diagnostic Advisor Button 408A, an Engine Performance Estimator Button 408B, an Electronic Technician Button 408C, an SIS Button 408D, a Data View Button 408E, and a Reports and Feedback Button 408F. Actuation of a button 408A-408F launches a respective service tools 304A-304F in the application container 406.

Industrial Applicability

Each of the service tools 104A-104B,304A-304F were designed to communicate externally, i.e., to the other service tools 104A-104B,304A-304F through the workbench 106,306, using a communication protocol

suitable to the service tool and its operation. For example, the Electronic Technician 304C communicates using the Dynamic Data Exchange protocol (DDE), the Diagnostic Advisor 304A communicates using the Component Object Model (COM), the SIS 304B communicates using the Transmission Control Protocol/Internet Protocol (TCP/IP), and the Data View Module 304D uses operating system messages to implement focus switching functionality.

As described above, each of the service tools 104A,104B,304A-304F is accessible through the graphical user interface 400 of the workbench 106,306. The workbench 106,306 consolidates access to all of the service tools 104A,104B,304A-304F through a single sign-on and provides a common look and feel.

The application proxy 112A,112B, 312A-312F for each service tool 104A,104B,304A-304F includes a constant portion 114A,114B,314A-314F and an application programming interface 116A,116B,316A-316F. The constant portion 114A,114B,314A-314F allows a service tool 104A,104B,304A-304F to communicate with the other service tools 104A,104B,304A-304F. The constant portion 114A,114B,314A-314F typically does not change. The application programming interface 116A,116B,316A-316F couples the constant portions 114A,114B,314A-314F with the respective service tool 104A,104B,304A-304F. The application programming interface 116A,116B,316A-316F is custom written for each service tool 104A,104B,304A-304F 314A-314F in a variety of interprocess communication protocols (DDE, COM, TCP/IP, etc.). This allows the service tools 104A,104B,304A-304F to be updated with the latest

technology (code, platform, etc.) without affecting the communications between the service tools 104A,104B,304A-304F and without modification of the constant portion 114A,114B,314A-314F. This allows for a seamless flow of information and control data between the service tools 104A,104B,304A-304F thereby saving programming time and effort.

Other aspects, objects, and features of the present invention can be obtained from a study of the drawings, the disclosure, and the appended claims.